Water Quality Standards, TMDLs and Bioassessment

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Clean Water Act

to… "restore and maintain the chemical, physical and biological integrity of the nation's waters"…

- This is accomplished through
  - Development and implementation of Water Quality Standards (WQS) to protect the beneficial uses
  - Monitoring for compliance with the WQS
  - Restoration of Nevada water-ways

Water Quality Standards

- Traditionally based on Water Chemistry
  - Nutrients
  - Metals
  - Physical Parameters
    - Dissolved Oxygen, pH, Temperature
- Water chemistry should not be separated from habitat integrity: NV began (2000) monitoring biological and physical habitat characteristics

Water Quality Standards

- Established for Major Water-Ways
  - Snake Basin, Truckee, Tahoe, Walker, Carson, Virgin, Muddy & Colorado Rivers
- Criteria based on the Beneficial Uses
  - Municipal/Domestic/Industrial Water Supply
  - Irrigation/Stock Watering
  - Recreation – Contact, Non Contact
  - Propagation of Wildlife
  - Aquatic Life

Water Quality Standards

- Development of Numeric Standards
  - Recommended criteria developed by EPA for the protection of the beneficial use(s)
    - e.g. Iron (1000 µg/l aquatic life)
    - EPA criteria is generally based on laboratory toxicological testing

Beneficial Use Criteria

- State can either

  Implement the EPA recommended criteria and establish the standard

  Or

  Develop their own numeric standard, EPA approval required (e.g. Walker Lake pH)

What Happens when the Water Quality Standards are not Met?

- Monitoring data is compared to the WQSs
  - Various sources of data are used
- Listing methodology for the CWA 303(d) List
  - When 10% of the samples are out of compliance with the WQS, that river section is listed on the ***CWA 303(d) List of Impaired Waters****

Authority

- Only the State and approved Tribes have the authority to establish Water Quality Standards

And

- Only the State and approved Tribes have the authority to define and list impaired waters

303(d) Listings for the Truckee River 2002

- Calif. Stateline to E. McCarran Bridge
  - Temperature
- E. McCarran Bridge to Lockwood
  - Total Phosphorus
- Lockwood to Derby Dam
  - Total Phosphorus and Turbidity
- Derby Dam to the Reservation
  - Total Phosphorus, Turbidity & Temperature

From 303(d) Listing to TMDLs

- Total Maximum Daily Load (TMDL)
  - Required by the CWA to develop a numeric allowable load of pollutant necessary to meet WQS
  - TMDLs can be more than a calculated numeric load number
    - River miles restored
    - Percent shading
    - Bio-diversity

How does Water Quality Standards, 303(d) Listing and TMDLs relate to Bioassessment???

Bioassessment can include the fishery, macroinvertebrates, periphyton, chemical and physical habitat and other biological parameters in aquatic systems

The Application of Bioassessments

I. Assist in Defining and Developing **Beneficial Uses** for WQSs

- ***Aquatic Life*** is a beneficial use for a majority of Nevada waterways
  - Aquatic life requirements need to be better defined
  - Present or absence of the beneficial use: LCT present or absent?

Application of Bioassessments (con't....)

II. To determine if water chemistry standards are appropriate to protect aquatic life
   - Is the numeric WQS Correct for the Arid West Environment?

III. To support/not-support or partially support chemical parameter listing on the 303(d) List

Application of Bioassessments (con't….)

IV. Target/Goal for TMDL Implementation
   - Example: Goal of 20% increase in Stoneflies abundance 2 years after the TMDL implementation

V. Water body assessments: aquatic and riparian health

VI. Evaluate the effectiveness of restoration projects

VII. Provide additional "Candidate" beneficial uses

VIII. What's currently in the system and what has the potential to be there given constraints?